Comment Set F2 – Southern California Edison

Attachment A
SCE's Transmission Planning Assessment of the
DEIR/DEIS's Phased Build Alternative

F2-1

Attachment A provides a summary of SCE's review of the DEIR/DEIS's Phased Build Alternative. This document concludes that the Phased Build Alternative has serious flaws and that SCE's Proposed Project is superior to the Phased Build Alternative based on several factors, as described below.

1. **The DEIR/DEIS Confuses the Conductor Name Plate Capacity With the Maximum Corridor Transfer Capability.**

   The conductor name plate provides an indication of the maximum flow that can be carried on the conductor under normal and emergency conditions in the absence of other system limitations. In the case of the West of Devers ("WOD") corridor, the maximum flow capability is approximately 3,000 MW with the use of 795 ACCR conductor and 4,800 MW for the double-bundle 1590 ACSR conductor. This maximum value ensures the power flow stays within the emergency thermal rating of the conductor upon the loss of any two transmission lines west of Devers Substation in accordance with the NERC Reliability Standards, and includes the reliance on a Remedial Action Scheme (RAS) that trips generation so the power flow stays within allowable limits. The 3,000 MW for the 795 ACCR conductor and 4,800 MW for the double-bundle 1590 ACSR is based on conductor name plate limitation and does not take in account any other system conditions.

   To determine the actual flow that can be carried on the WOD corridor with the use of a specific conductor, thorough power flow and dynamic stability analyses are required. These complete set of analyses are needed to evaluate other critical system parameters, such as reactive losses, voltage condition, and power angles. As such, the conductor name plate capacity all by itself does not equal system deliverability or capability.

   For example, in the power flow analysis conducted by ZGlobal in Case 6, the use of 795 ACCR conductor would limit the flow through the WOD corridor to approximately 1,900 MW due to system voltage instability caused by excessive reactive power losses.[1] This is due to the high impedance of 795 ACCR conductor coupled with the amount of current flowing through the conductor. When the loading through the WOD corridor exceeds the 795 ACCR conductor's Surge Impedance Loading (SIL),[2] the 795 ACCR conductor acts like a shunt reactor - absorbing reactive power (MVAR) from the system, which is referred to as MVAR losses on the line. This results in a decrease in system voltage, leading to a higher

[1] DEIR/DEIS, Appendix 5, Attachment 2, Power Flow Analysis report completed by ZGlobal, Case #6 conclusion, p. 12.

[2] Surge Impedance Loading (SIL) is the MW loading of a transmission line at which a natural reactive power balance occurs.

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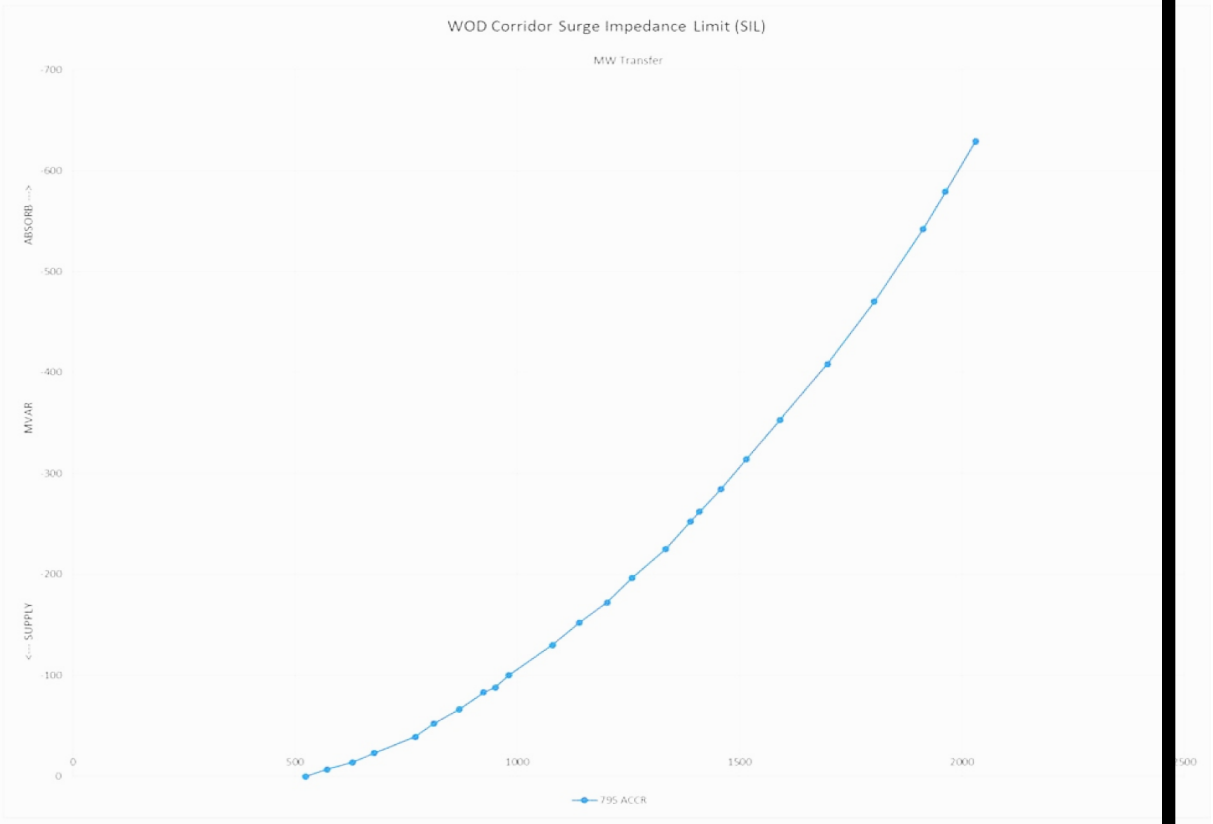
potential for system voltage instability. Thus, the 1,900 MW limitation safeguards against system voltage instability due to the excessively high MVAR losses on the 795 ACCR conductor.

F2-1 cont.

As illustrated in the SIL chart below, the reactive losses on the 795 ACCR conductor are approximately 570 MVAR when the flow through the WOD corridor is approximately 1,900 MW.



In addition to the excessive MVAR losses limiting the maximum flow on the WOD corridor, the higher impedance of 795 ACCR conductor would incrementally increase the flow on the transmission lines parallel to the WOD corridor, such as the Valley – Alberhill 500 kV line. ZGlobal's Case 6 demonstrated that the use of 795 ACCR would increase the loading on the Valley – Alberhill 500 kV line by 4% as compared to the double-bundle 1590 ACSR conductor.[3] The Valley – Alberhill 500 kV line has been identified in previous Generation Interconnection Studies to be the next system limitation for delivering resources west of

[3] The 4% increase is the difference between the loading on Valley – Alberhill on table B2 and B3 provided by ZGlobal in DEIR, Appendix 5, Attachment 2, Appendix A "Analysis results tables & Power Flow Plots," pp. 24 and 26.

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Devers Substation, and therefore the use of 795 ACCR conductor would expedite the need for additional system upgrades.

F2-1 cont.

In contrast, the use of double-bundle conductor doubles the SIL and minimizes the MVAR losses, thus the potential for voltage instability is minimized. In addition, the double-bundle 1590 ACSR conductor has a lower impedance value, which allows higher flow through the WOD corridor under comparable assumptions; up to approximately 3000 MW, before the next system upgrade is triggered.

2. The ZGlobal Analysis Supporting the Phased Build Alternative Is Flawed.

F2-2

A. The ZGlobal Study Misapplies System Reliability Study Methodology to Resource Deliverability Analysis.

The purpose of performing System Reliability studies is to identify reliability network upgrades needed to serve the study year load forecast. The CAISO's Reliability base cases dispatch generation throughout the CAISO's control grid and limits local renewabl resources to certain dispatch levels in an attempt to segregate upgrades required for new generation from upgrades needed to serve load. In other words, the dispatch levels set by the CAISO in the Reliability cases are intended to eliminate any network upgrades needed for new generation and only identify network upgrades needed to meet the study year load forecast. For example, the CAISO's 2024 Reliability Base Case that was used to validate the DEIR/DEIS Phase Build Alternative limits Photovoltaic and Solar Thermal to 36% and Wind resources to 0% of its maximum capability. This way, any reliability network upgrades identified from the CAISO's 2024 Reliability studies would be solely triggered as a result of the need to serve 2024 system load forecast.

In contrast, the CAISO develops Policy Base Cases to identify delivery network upgrade to ensure that generation capacity is not constrained from a Resource Adequacy perspective. The deliverability study methodology simultaneously dispatches all generation resources in a cluster area seeking full deliverability status to identify delivery network upgrades.

Given that the delivery network upgrades cannot be identified in the Reliability base case the conclusion of the DEIR/DEIS that the Phased Build Alternative would provide 2,200 MW of deliverability based on CAISO's 2024 Reliability Base Case[4] is flawed. To adequately determine the actual MW of deliverability that can be achieved by the Phase Build Alternative, a deliverability study is needed that is consistent with the CAISO's deliverability study methodology.

[4] DEIR/DEIS, Appendix 5, Consideration of CEQA/NEPA Criteria under Project Objectives Purpose and Need, p. Ap.5-48.

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B. The ZGlobal Studies Did Not Demonstrate That the Use of 795 ACCR Conductor As Proposed in the Phased Build Alternative Would Increase System Deliverability by At Least 2,200 MW. F2-3

The Phased Build Alternative relied on a power flow analysis prepared by ZGlobal, included in Appendix 5 of the DEIR/DEIS, to determine that the alternative conductor (795 ACCR conductor) would increase system deliverability to 2,200 MW. However, none of the ZGlobal Cases demonstrated that the selection of 795 ACCR conductor would actually increase system deliverability by at least 2,200 MW.

ZGlobal's Case 3 was the only Case which concluded that the 795 ACCR conductor is a feasible alternative conductor. However, Case 3 did not properly model Basic Project Objective 1, which is to increase system deliverability by at least 2,200 MW to meet the CAISO's initial group of five solar power generation projects interconnecting at Colorado River and Red Bluff Substations.[5] A detailed review of Case 3 indicates that this Case only assumed 1,387 MW of generation resources at Colorado River and Red Bluff substations, which is significantly less than 2,200 MW identified in the DEIR's Basic Project Objective 1. In addition, today, there are 1,050 MW of generation is on line at Colorado River and Red Bluff substations. Therefore, based on Case 3, only a total of 337 MW of additional new resources could develop at both Colorado River and Red Bluff substations, which is significantly less than 1,929 MW[6] with executed generator interconnection agreements at this time.

Assuming only 337 MW of new generation at Colorado River and Red Bluff Substations significantly downplays the importance of both the Colorado River and Red Bluff Substations for interconnecting new renewable resources. The unrealistically low level of generation at Colorado River and Red Bluff Substations ignores the resources currently under development. The renewable generation projects are aligning their in-service dates with completion of the WOD Upgrade Project to minimize potential curtailments and obtain Full Capacity Deliverability Status (FCDS).[7]

Furthermore, with the inclusion of Cluster 8, there are sixteen (16) generation projects totaling 6,072 MW, which would all require the WOD Upgrade Project to support FCDS. Five (5) projects have executed GIAs with SCE for a total of 1,859 MW that require the WOD Upgrade Project for FCDS.

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5 DEIR/DEIS Executive Summary, Basic Project Objective 1, p. ES-6.

6 The 1,929 MW consist four projects (Q294, 365, 576, and 643AE), totaling 1,359MW, require the WOD upgrades for FCDS and two projects (Q17 and 219) totaling 570MW that would increase the flow on the WOD corridor.

7 Refer to the generation projects letters provided in SCE's testimony and in SCE's response to data request ALT-17D

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In addition, Base Project Objective 1[8] indicates that the Phase Build Alternative would provide FCDS to generation listed in Table Ap.5-3 of Appendix 5 and this conclusion was satisfied by utilizing the CAISO's 2024 Reliability Base Case (Case 3). Table Ap.5-3 includes 10 generation projects, totaling 3,029 MW, with an interconnection request to Colorado River and Red Bluff Substations. Case 3 limits the generation resources dispatched at Colorado River and Red Bluff Substations to 1,387 MW and therefore does not demonstrate that the Phase Build Alternative would provide FCDS to generation listed in table Ap.5-3. **F2-3 cont.**

Based on the reasons above, Case 3 does not demonstrate that 795 ACCR conductor would meet the Basic Project Objective 1 of increasing deliverability to at least 2,200 MW for those resources which are seeking interconnection at the Colorado River and Red Bluff Substations.

The DEIR/DEIS Phased Build Alternative's failure to meet the Basic Project Objective 1 of increasing deliverability to 3,000 MW of the output from new generation projects[9] is further revealed to be flawed by reviewing the ZGlobal studies for Case 6. Case 6 modeled the use of 795 ACCR conductor and included approximately 2,628 MW of new not yet existing generation resources at Colorado River and Red Bluff Substations. ZGlobal concluded that the use of 795 ACCR conductor under the Case 6 study assumptions was "not technically feasible." (ZGlobal)[10] This conclusion clearly states that the use of 795 ACCR conductor cannot possibly accommodate 2,628 MW of new generation at Colorado River and Red Bluff Substations.

Given that Case 3 was based on an incorrect assumption of the generation levels at Colorado River and Red Bluff Substations, and Case 6 concluding that the 795 ACCR is "not technically feasible," the power flow analysis conducted by ZGlobal failed to demonstrate that the 795 ACCR alternative conductor would meet the DEIR/DEIS's stated Objective 1. **F2-4**

C. ZGlobal Misrepresented the MW Capacity That Require the WOD Upgrades.

The following statement by ZGlobal is incorrect "This leaves approximately 1881 MW requiring the WOD upgrades – a greater than 300 MW decrease from the original TC Study requirement of 2200 MW".[11]

The DEIR/DEIS interpreted the CAISO's response out of context. Generation projects listed in Table 1 in the CAISO's response only includes projects in the queue that would

8 DEIR/DEIS, Appendix 5, Basic Project Objective 1, p. Ap.5-48.
9 DEIR/DEIS, Appendix 5, Project Objectives Purpose and Need section, p. Ap.5-48.
10 DEIR/DEIS, Appendix 5, Attachment 2, Power Flow Analysis report completed by ZGlobal, Case #6 conclusion, p. 12.
11 DEIR/DEIS, Appendix 5, Attachment 2, A Power Flow Analysis report provided by ZGlobal, p. 6.

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be adversely impacted by a delay to the WOD Upgrade Project. This list did not include projects that were granted FDCS with the existing facilities or FCDS with the inclusion of the Interim WOD Project. While those projects that are currently utilizing the Interim WOD Project would not be adversely impacted by a delay in the project, they ultimately need the WOD Upgrade Project. The Interim WOD Project is a temporary mitigation solution that is not electrically compatible with the WOD Upgrade Project and would be removed upon completion of the WOD Upgrade Project. Therefore, the 1,881 MW assumption must additionally account for two Transition Cluster projects (Q193, and 294) totaling 985 MW that would need a solution robust enough to grant the requested FCDS to these two projects on a permanent basis. As such, the WOD Upgrade Project must provide FCDS for at least 2,866 MW (1,881 MW described by ZGlobal and 985 MW for Q193 and Q294) and not 2,200 MW as described in Basic Objective 1. **F2-4 cont.**

In addition, the capacity provided by the WOD Upgrade Project should not be limited to 2,866 MW. Instead, it should be designed to provide additional transfer capability for future developments such as new generation resources seeking interconnection to Red Bluff and Colorado River Substations as part of Queue Cluster 8. Currently, there are seven (7) projects in CAISO's Cluster 8, totaling over 3,600 MW that submitted interconnection requests seeking FCDS for their proposed generation facilities. These new generation projects would also rely on the WOD Upgrade Project to support FCDS. Therefore, the use of 795 ACCR conductor does not provide adequate support for expected generation developments at both Colorado River and Red Bluff Substations.

D. <u>The DEIR/DEIS Made Flawed Assumption About the WOD Upgrade Project Based Upon the Entire CAISO Queue.</u> **F2-5**

The following statement made in the ZGlobal analysis is inapplicable to the WOD Upgrade Project: "The CAISO queue overall, through Cluster #7, had approximately 1179 projects submitted. The number of projects withdrawn is 892. That represents a nearly 76% drop out rate. Of the 1179 projects submitted for study by the CAISO, 97 have gone commercial, or ~ 8%."[12] The use of a 76% dropout and 8% commercial rate as blanket assumptions of what future generation will develop at Colorado River and Red Bluff Substations are flawed assumptions. Using the assumption that only 8% of the generation projects would be developed and stating that SCE's Proposed Project would be underutilized would lead to under-sizing the project as opposed to right-sizing the project to meet the need of renewable generators in the area.

Comparative analysis of the development of the WOD Upgrade Project to the development of SCE's Tehachapi Renewable Transmission Project (TRTP) shows why the use of blanket assumptions across the board are misleading assumptions. In the case of TRTP, a total of 73 projects that would utilize TRTP sought interconnection at the 220 kV voltage level. Of those 73 projects, 38 projects have withdrawn and 13 projects have already gone commercial with 8 additional projects currently under construction. In

[12] DEIR/DEIS, Appendix 5, Attachment 2, p. 6.

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contrast to the overall CAISO dropout rate, SCE has seen only a 52% dropout rate and a 18% commercial rate that will increase to 29%, both of which are significant improvements to the 76% dropout rate and 8% commercial rate included in the DEIR/DEIS. In fact, based on the number of interconnection request in the Tehachapi area, the TRTP will be fully utilized once its construction is completed. This further demonstrates that generation projects develop where transmission line capacity is available. Another example is the Eldorado – Ivanpah Transmission Project (EITP). The EITP had a total of 18 projects with interconnection requests that would require the EITP upgrade. Of those 18 projects, 7 projects have withdrawn and 3 projects have gone commercial with 3 additional projects that are currently under construction. Again, in contrast of the overall CAISO dropout rate, the EITP has a 39% dropout rate and 33% commercial rate. These figures clearly demonstrate that a blanket assumption based on statistics of the entire queue are not applicable across the board and that the rates are expected to improve in areas where transmission projects, such as the WOD Upgrade Project, are developed.

F2-5 cont.

3. The Phased Build Alternative Would Fail to Meet the Project Objectives.

F2-6

A. <u>The Phased Build Alternative Would Fail to Fulfill the DEIR/DEIS Basic Project Objective 2.</u>

The Phase Build Alternative would not fulfill Basic Objective 2 since this alternative significantly limits the corridor's transfer capability. In evaluating the Phase Build Alternative, the DEIR/DEIS analysis demonstrates that the corridor capacity (actual power flow capability) would be limited to approximately 1,900 MW (per ZGlobal Case 6 Studies). As a result of limiting the corridor capability, the Phased Build Alternative would introduce a barrier to the achievement of State and Federal renewable energy goals and would accelerate the need to again upgrade the WOD corridor. Footnote 2 on Ap. 5-53 of the Appendix 5 in the DEIR/DEIS indicates that since the Phased Build Alternative is a smaller upgrade to the SCE Proposed Project, the renewable resources portfolio might be shifted from Riverside East Renewable Energy Zone to different zones based on RPS Calculator V.5. The need to shift resources from one renewable energy zone to another when performing the Deliverability Analysis is a clear indicator that the use of the 795 ACCR conductor in the Phase Build Alternative creates a barrier to the integration of resources in the Riverside East area. SCE's Proposed Project provides sufficient transfer capability on the WOD Corridor, allowing significantly more renewable generation to be developed and delivered from the Riverside East zone to the LA Basin load centers. In order to meet Basic Objective 2, the WOD Upgrade Project should be designed to maximize the corridor capacity consistent with prudent long-term planning, the State's greenhouse gas reduction goals, and renewable energy goals, while taking into account the overall environmental and cost impacts.

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B. The Phased Build Alternative Would Fail to Meet the DEIR/DEIS Basic Project Objective 3. F2-7

The inclusion of Basic Project Objective 3 in the DEIR/DEIS suggests that the CPUC and BLM recognize that the WOD corridor is a critical path for renewable development in the Riverside East and Imperial Valley zones. Such identification has been made in several regional studies such as DRECP,[13] PEIS[14] and the CPUC's LTPP,[15] yet the proposed Phased Build Alternative limits the corridor transfer capacity. SCE agrees with the premise that it is important to maximize the availability of remaining space in the corridor to the extent practicable, so future use of the corridor for additional transmission lines is not precluded. However, it is critical to first maximize the capacity of any initial upgrade undertaken within this critical corridor, and do so in a manner that is the least environmentally impactful and reduces costs taken as a whole. Then and only then should project goals ensure that the future use of the corridor is not precluded. In essence, following the Garamendi Principles and ensuring capacity is maximized within the corridor by utilizing the SCE proposed double-bundle 1590 ACSR conductor would eliminate the need to build the next phase, thus reducing environmental impacts and costs and would also defer the need for a new 500 kV or 220 kV transmission lines through the WOD corridor until State policy goals and/or generator development triggers the additional need.

In addition, the Phased Build Alternative was proposed with the understanding that an expansion to the corridor would likely be needed in the near future.[16] The fact that the Phased Build Alternative would be constructed only to have to be torn-down within a few years after construction is not indicative of good transmission planning practices.

Given that it is anticipated that more generation projects will come online during the construction time frame of the initial phase of the Phased Build Alternative, taking the transmission lines in the WOD corridor out of service again for construction of the next phase of upgrades would require significant generation curtailment during construction.

SCE's Proposed Project, would maximize the existing transmission corridor transfer capability to meet California's long-term needs in light of the State's numerous environmental goals. SCE designed the project in a manner to minimize future environmental impact and waste associated with multiple tear-down and rebuild activities.

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13 Transmission Technical Group Alternative 5.

14 Final Programmatic Environmental Impact Statement, Vol. 2, pp. 9.4-143. http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide/Documents/Final_PEIS.html.

15 Assigned Commissioner's Ruling on Assumptions, Scenarios, and Portfolios of February 27, 2014 in R.13-12-010.

16 DEIR/DEIS, Cumulative Scenario and Impact, Future 500 kV Transmission line in WOD corridor, p. E-13.

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4. The Phased Build Alternative Would Create Unacceptable Outcomes.

F2-8

A. The Phased Build Alternative Would Inappropriately Reduce and Change SCE's Project Objectives.

In the Proponent's Environmental Assessment (PEA), and as updated in the April 17, 2015 testimony, SCE explained that the purpose of the WOD Upgrade Project was to eliminate the limited transmission transfer capability that currently exists on the transmission lines that connect the Devers Substation to the El Casco, San Bernardino, and Vista Substations in order to:

- Integrate Planned Generation Resources
- Comply with terms of Generator Interconnection Agreements that SCE has entered into with various generators
- Facilitate the FCDS of new electric generation resources being developed in the Blythe and Desert Center Areas
- Facilitate Progress Toward Achieving Renewables Portfolio Standard Goals By Providing Transmission Upgrades to Deliver Renewable Generation in Blythe and Desert Center Areas
- Accommodate increased flows from Path 42
- Enable Distributed Generation (DG) in the Devers area to achieve FCDS
- Support Integration of Small Scale Generation
- Support California's GHG Reduction Program
- Support Goals of the CEC integrated energy policy report
- Support Desert Renewable Energy Conservation Plan
- Support the power flow increase associated with the proposed Delaney-Colorado River 500 kilovolt (kV) project

The DEIR/DEIS dismisses the majority of these objectives, and then further reduces the Proposed Project's purpose and need.

The DEIR/DEIS's Basic Project Objective 1, for example, limits the system deliverability increase to the initial five solar power generation projects totaling 2,200 MW from the CAISO's transition cluster, ignoring the fact that transmission capacity is required for subsequent generation development in the Blythe and Desert Center areas for these resources to achieve the FCDS.

Basic Project Objective 1 would not allow for additional transfer capacity that is reasonably expected to be required and adversely impacts the following West of Devers

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Upgrade Project's Purpose and Need:[17]

F2-8 cont.

- Maximize import capability (MIC) out of IID
- Provide for the requested FCDS of seven (7) WDT projects totaling 108 MW seeking interconnection in the Devers and Valley areas
  Provide for deliverability to Distributed Generation located in the Devers area
- Provide additional transfer capability to accommodate the flow increase due to CAISO's approved Delaney–Colorado River 500 kV project. The Delaney-Colorado River project would help to support the deliverability for generation projects located in the Imperial Valley area
- Support reasonably expected generation development beyond the five Transition Cluster generation projects initially identified to trigger the need for the WOD Upgrade Project
- Support California's GHG Reduction Program

B. <u>The Phased Build Alternative Would Trigger Additional Transmission System Upgrades That Were Not Evaluated in the DEIR/DEIS.</u>

F2-9

As noted in the Consideration of CEQA/NEPA Criteria Section,[18] the Phased Build Alternative relied on a Power Flow Analysis prepared by ZGlobal to determine if the alternative conductor (795 ACCR conductor) would increase the system deliverability by 2,200 MW. The results of Case 6 concluded that the proposed 795 ACCR conductor is in fact NOT technically feasible to increase system deliverability without additional system upgrades. However, these additional upgrades were not considered in the DEIR/DEIS. Case 6 shows that the implementation of a RAS and the installation of 600 MVAr shunt capacitance, consisting of several smaller capacitor banks installed at undisclosed locations, would be required with the use of the 795 ACCR conductor. These facilities are not required as part of SCE's Proposed Project that uses a double-bundle 1590 ACSR conductor to meet the generation interconnection request up to cluster 7. Case 6 modeled the use of 795 ACCR conductor, assumed use of a RAS, added 600 MVAR of reactive support at undisclosed locations, and included approximately 2,628 MW of new not yet existing generation resources at Colorado River and Red Bluff Substations. These additional upgrades need to be evaluated in the DEIR/EIS as they would have environmental, schedule, cost impacts, and may not even be feasible given large size and limited substation land availability. Moreover, the conclusion of Case 6 demonstrates that the use of a 795 ACCR conductor is extremely short-sighted as it does not adequately support expected generation developments at both Colorado River and Red Bluff substations.

[17] As described in SCE's Proponents Environmental Assessment Chapter 1, and updated in SCE's April 17, 2015 testimony.

[18] DEIR/DEIS, Project Objectives Purpose and Need section, p. Ap.5-48.

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C. The Phased Build Alternative Would Adversely Impact the Fundamental Project Purpose of Integrating Planned Generation Resources. F2-10

At the time SCE prepared its PEA, the CAISO and SCE generation interconnection studies identified ten (10) generation projects totaling 2,479 MW that required the Proposed Project to obtain FCDS, of which three projects had executed GIAs with SCE for a total of 1,485 MW. Currently, the inclusion of Cluster 8 and modifications to prior queued projects details are provided below, the number of the interconnection requests has increased to sixteen (16) generation projects, totaling 6,072 MW. The WOD Upgrade Project as proposed would be required to provide FCDS for these 16 generation projects.[19] Given the limitations of transfer capability corresponding to the use of 795 ACCR conductor for the Phased Build Alternative, the amount of deliverability is significantly reduced in comparison to SCE's Proposed Project, creating a barrier for renewable development in the Colorado River and Red Bluff substation areas. Thus, the proposed WOD Upgrade Project is a critical project for renewable development in the Riverside East and Imperial Valley. The total designated Renewable Resource Portfolio for Riverside East and Imperial area to meet 33% by 2024 is 4,767 MW. The Phase Build Alternative would become an impediment in achieving and maintaining California's 33% RPS and for the further increase to 50% renewables as required under SB 350.

Details of the changes that affect the generation interconnection information provided in the PEA are:

- Two generation projects, totaling 985 MW (Q193 and Q294), were granted FCDS on a temporary basis via the Interim West of Devers Project. The Interim West of Devers Project will be removed after the completion of the Proposed Project as it would provide no additional capacity or benefits to the system. Therefore, the capacity provided by the WOD Upgrade Project must account for these projects.
- Five generation projects which include the two projects granted FCDS on a temporary basis, totaling 1,859 MW, have executed LGIAs. See Table 1.1
- Two generation projects, totaling 200 MW which have requested FCDS are in GIA negotiation.[20] See Table 1.2
- Two new generation projects (Cluster 7), totaling 400 MW have requested FCDS for their proposed generation facilities. These new generation projects require the WOD Upgrade Project to achieve FCDS. LGIAs for these two projects are currently expected no later than December 2016.[21] See Table 1.3

[19] Some projects may require additional upgrades beyond the WOD Upgrade Project to achieve the FCDS and would be determined by CAISO.

[20] Q421 has made the first and second required financial posting, Q790 has made the initial financial security posting and the project is currently parked waiting for TP deliverability allocation.

[21] Cluster 7 projects have provided their interconnection financial security in accordance with the CAISO tariff. This posting was due 90 days after the completion of its Phase 1 study, the second posting shall be made 180 calendar days after the issuance of the final Phase 2 interconnection study report.

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- Seven new generation projects (Cluster 8), totaling over 3,600 MW have submitted interconnection request where the Interconnection Customers have requested FCDS for their proposed generation facilities. These new generation projects would also rely on the WOD Upgrade Project to support FCDS. See Table 1.4.
- Two generation projects (Q588 and Q797) have withdrawn from the interconnection process.
- Three generation projects, totaling 720 MW (Q17, Q219, and Q138) have executed GIAs, which impact flows and need to be accounted for even though they do not rely on the WOD Upgrade Project for FCDS. See Table 1.5.

The resulting MW capacity of the generation projects requesting interconnection to Colorado River and Red Bluff substations depend on the proposed WOD Upgrade Project to support FCDS increased from 2,479 MW to 6,072 MW, of which 1,859 MW have executed GIAs.

Given the large amount of impending generation projects in CAISO's queue in the Colorado River and Red Bluff Substation areas, permitting for a subsequent expansion of the WOD corridor would need to be initiated prior to completion of construction of the Phased Build Alternative.

Table 1.1

Interconnection Projects Require the WOD Upgrades for FCDS With Executed LGIAs

CAISO Queue #	Technology	Point of Interconnection	Project MW	Comments
294	Solar PV	Colorado River 220 kV Bus	485	LGIA – Executed In-service date: 12/2016-2/2020
365	Solar Thermal	Red Bluff 220 kV Bus	500	LGIA - Executed In-service date: 12/2020-11/2021
193	Solar PV & Solar Thermal	Colorado River 220 kV Bus	500	LGIA - Executed Already in-service
576	Solar PV	Colorado River 220 kV Bus	224	LGIA – Executed In-service date: 09/2018
643AE	Solar PV	Red Bluff 220 kV Bus	150	LGIA – Executed In-service date: 08/2019

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Total	1,859 MW

Table 1.2

Interconnection Projects Require the WOD Upgrades for FCDS Under GIA Negotiation

CAISO Queue #	Technology	Point of Interconnection	Project MW	Comments
421	Solar PV	Red Bluff 220 kV Bus	50	LGIA - Under Negotiation Propose In-service date: 12/2020
970	Solar PV	Colorado River 220 kV Bus	150	LGIA – Under Negotiation* Propose In-service date: 09/2018
		Total	200 MW	

* LGIA is pending as a result of the IC's election to "Park" the project until the 2016 TP Deliverability Allocation

Table 1.3

Interconnection Projects Require the WOD Upgrades for FCDS in Phase 2 Study

CAISO Queue #	Technology	Point of Interconnection	Project MW	Comments
1070	Solar PV	Red Bluff 220 kV Bus	250	Study Phase-QC7 Phase II Propose In-service date: 12/2018
1071	Solar PV	Colorado River 220 kV Bus	150	Study Phase-QC7 Phase II Propose In-service date: 5/2019

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Total	400 MW

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Table 1.4

Interconnection Projects Would Depend on the WOD Upgrades for FCDS in Phase 1 Study

CAISO Queue #	Technology	Point of Interconnection	Project MW	Comments
1194	Natural Gas	Colorado River 220 kV Bus	600	Study Phase-QC8 Phase I Propose In-service date: 6/2020
1192	Solar PV	Colorado River 220 kV Bus	463	Study Phase-QC8 Phase I Propose In-service date: 12/2020
1198	Solar PV	Colorado River 220 kV Bus	150	Study Phase-QC8 Phase I Propose In-service date: 12/2020
1196	Solar PV	Colorado River 220 kV Bus	400	Study Phase-QC8 Phase I 4/2022
1193	Hydro Pump Storage	Red Bluff 220 kV Bus	1400	Study Phase-QC8 Phase I Propose In-service date: 1/2022
1200	Solar PV	Red Bluff 220 kV Bus	200	Study Phase-QC8 Phase I 12/2018
1197	BAT	Red Bluff 220 kV Bus	400	Study Phase-QC8 Phase I Propose In-service date: 9/2018
Total			3,613 MW	

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Table 1.5

Interconnection Projects Would Impact the Flow on the WOD Corridor With Executed GIAs

CAISO Queue #	Technology	Point of Interconnection	Project MW	Comments
17	Combined Cycle	Colorado River 500 kV Bus	520	LGIA – Executed Propose In-service date: 1/2018
138	Wind Turbine	Devers – Vista No.1 220 kV Line	150	LGIA – Executed Propose In-service date: 9/2020
146	Solar PV	Red Bluff 220 kV Bus	150	LGIA – Executed Already in-service
147	Solar PV	Red Bluff 220 kV Bus	400	LGIA – Executed Already in-service
219	Combined Cycle	Colorado River 500 kV Bus	50	LGIA – Executed Propose In-service date: 1/2018
		Total	1,270 MW	

F2-10 cont.

D. The Phased Build Alternative Would Increase the Power Losses Throughout the System.

The use of 795 ACCR conductor would increase the power losses through the WOD corridor and throughout the system compared to the use of double-bundle 1590 ACSR conductor. Given the 795 ACCR conductor resistance is almost four times larger than the double-bundle 1590 ACSR conductor and the power losses are a function of the conductor resistance and the square of the line current, as compared with the double-bundle 1590 ACSR conductor the use of 795 ACCR conductor would increase the system power losses by 62 MW when those lines are operating to their maximum line current

F2-11

Comment Set F2 – Southern California Edison (cont.)

capability. Out of 62 MW losses throughout the system, approximately 30 MW is lost through the WOD corridor.[22] F2-11 cont.

E. The Phased Build Alternative Would Create Operational Complexity. F2-12

The proposed Phased Build Alternative would require the implementation of a RAS to trip generation projects to mitigate instability and thermal overloads along with the installation of a large amount of reactive support. In addition, the implementation of a RAS as a result of limited transfer capability provided by the Phased Build Alternative may trigger the need for generation curtailment to maintain generation tripping up to the CAISO planning standard of 1,400 MW (as defined in the ISO Transmission Planning Standards ISO SPS3).

In contrast, SCE's Proposed Project would provide sufficient transfer capability to meet the immediate and imminent system needs up to cluster 7 (2,459 MW) without any additional upgrades.

F. The Phased Build Alternative Would Adversely Impact Generation Developments. F2-13

Given that the Phased Build Alternative would require new engineering and design work, a delay to the completion of the project would occur. SCE anticipates that if the CPUC ultimately selects the Phased Build Alternative, there would be a two-year delay to the project. As discussed in the PEA and the associated data requests, a delay to the completion of the WOD Upgrade Project would adversely impact generation development for the following reasons:

- Delay to the development of renewable resources, since the WOD upgrade is required for generation achieve FCDS.
- Possible impact to ongoing Power Purchase Agreement negotiations
- Potential failure for generators to comply with the terms of existing PPAs.
- Likely present financial adversity to generation projects and threaten the viability of generation development.
- A delay to the WOD Upgrade Project may cause generation projects to postpone their respective commercial operation dates to align with a modified WOD project timeline, potentially adversely impacting such projects' environmental studies, permits, and financial obligations/opportunities.
- Possible delay to increase MIC for IID, consequently, place at risk the financial viability of generation development in the IID area that is dependent upon the MIC increase to meet existing PPA terms and/or the terms of ongoing PPA negotiations.

[22] The actual line losses would vary based on a number of factors including, for example, the amount of energy flowing through the lines, the ambient conditions such as temperature and wind speed, and the duration of various levels of current flow.

Comment Set F2 – Southern California Edison (cont.)

Please refer to the generation projects letters provided in SCE's testimony and in SCE's response to data request ALT-17D to better understand the potential impacts to the generation projects in the Eastern area form the possible delay to the WOD Upgrade Project.

F2-13 cont.

Responses to Comment Set F2 – SCE's Attachment A

F2-1 SCE's comments assert that the power flow modeling by ZGlobal is flawed. In general, the EIS does not need to attempt to resolve the differences in opinion between SCE and ZGlobal on the adequacy of the Phased Build Alternative or the methodology of the analysis disclosed in the Draft EIR/EIS. The EIS includes a sufficient degree of analysis to provide decision makers with information which enables them to make a decision that takes account of environmental consequences. The following individual responses aim to clarify how the technical study of the Phased Build Alternative is used and presented within the EIS.

This comment identifies technical concerns related to the capabilities of the Phased Build Alternative's 795 Aluminum Conductor Composite Reinforced (ACCR) conductors and the electrical properties of this type of conductor in the context of the system.

The comment asserts that the Draft EIR/EIS confuses the conductor name plate capacity with maximum corridor transfer capability. The EIS does not include any reference or use of the term "name plate" capacity. The description of capabilities in Appendix 5, Section 4.4 (Phased Build Alternative) focuses on whether the alternative could satisfy Basic Project Objective 1, to increase system deliverability. The EIS clearly discloses that the Phased Build Alternative would have lower power flows and a lower corridor transfer capability than the Proposed Project (Appendix 5, Attachment 1 and Attachment 2), as noted in Response to Comment F1-8.

The comment describes the results of the ZGlobal power flow modeling Case #6 (in EIS Appendix 5, Attachment 2) as illustrative of the electrical performance limitations of the Phased Build Alternative. The comment points to this case and indicates that to determine the "actual flow" that can be carried on the West of Devers corridor would require a more complete set of power flow and dynamic stability analyses.

In contrast with the assertion made by the comment, the ZGlobal analysis does include a thorough power flow analysis and voltage analysis. The analysis does not include a dynamic stability analysis, which would generally be warranted if power flow analysis shows major overloads and significant voltage violations in the area under study. The power flow analysis represents a first level screening tool that determines whether a dynamic stability analysis would be needed or not. Because Case #3 of the modeling did not indicate major problems in the system with the 795 ACCR conductor, ZGlobal did not perform additional dynamic stability analysis. The limitations described in this comment are from SCE's review of Case #6, although the power flow modeling conclusion for Case #6 notes that the Phased Build Alternative is not technically feasible in this scenario (EIS Appendix 5, Attachment 2, p. 12).

The comment discusses the Surge Impedance Loading (SIL) capabilities of the 795 ACCR conductors compared with the Proposed Project conductors, which would allow greater SIL. In contrast with other properties specified during transmission system planning, SCE notes this is one technical factor normally considered during the process of transmission line design. The SIL capabilities indicate how a particular conductor absorbs reactive power, or mega-volt-amps reactive (MVAR) power, which can lead to a decrease in system voltages and an increase in the potential for system voltage instabilities. Any given conductor will consume reactive power when loaded above SIL, but reactive power losses can be compensated by

using available capability within generators, capacitors, or other means of compensation, and if necessary, by adding new reactive power devices.

Technical review by ZGlobal indicates that the MVARs consumed by the four circuits of the West of Devers corridor using 795 ACCR conductor would be as follows:

- Devers-Vista 72 MVARs
- Devers–San Bernardino 49 MVARs
- Devers–El Casco–San Bernardino 50 MVARs
- Devers-TOT185HS-Vista 72 MVARs
- Total: 243 MVARs

This means that the total of 570 MVARs mentioned in SCE comment regarding the Phased Build Alternative may be an overstatement of these losses.

The comment concludes by stating that reactive power losses and the higher impedance of the 795 ACCR conductors when compared with the Proposed Project conductors would expedite the potential for future system upgrades becoming necessary. This is not an indication of infeasibility. Instead, the comment reflects SCE's view that the Phased Build Alternative would not satisfy system needs. See General Response GR-1 on the level of project need.

Also see previous individual responses (including Responses to Comments F1-10 through F1-15) that discuss the conclusion made in the Draft EIR/EIS that the Phased Build Alternative is "potentially feasible" and eligible for consideration within an EIS. Additionally, Responses to Comments F1-6, F1-7, and F1-8 address the performance of the Phased Build Alternative in the various power flow modeling cases.

F2-2 The comment states that the methodology of system reliability studies has been misapplied as a means of determining deliverability. Response to Comment F1-8 provides details on how the 2024 Reliability Base Case is used within the EIS, and how the EIS focuses on determining whether the alternative is feasible.

In conjunction with the statement that the use of the 2024 Reliability Base Case is flawed, the comment notes that a deliverability analysis would need to prepared in a manner consistent with the CAISO's deliverability study methodology. This comment is raised elsewhere, and Response to Comment F1-8 clarifies how additional information would be needed to determine the actual level of generation deliverability, in MW, provided by the Phased Build Alternative. Additionally, General Response GR-2 notes that the power flow analysis in the EIS does not include a formal study of deliverability. Instead, given NEPA requirements for alternatives, the EIS focuses on determining whether the alternatives are feasible.

The CAISO comments on the Draft EIR/EIS (Comment B9-8) indicate CAISO's intent to conduct a comparative analysis of project alternatives using the CAISO's deliverability study methodology, and CAISO intends to present its results in testimony in the CPUC general proceeding (A.13-10-020).

Additional discussion in General Response GR-2 and other individual responses to SCE comments clarify how the Phased Build Alternative would be a potentially feasible means of satisfying most or all of the objectives.

F2-3 SCE's comment states that the ZGlobal power flow modeling did not demonstrate an increase in system deliverability by at least 2,200 MW, as set forth in Basic Project Objective 1. See General Response GR-2 on the ability of the Phased Build Alternative to satisfy Basic Project Objective 1. General Response GR-2 also notes that the power flow analysis in the EIS does not include a formal study of deliverability.

The comment correctly notes that the 2024 Reliability Base Case and power flow analysis Case #3 includes generation producing 1,387 MW at Red Bluff and Colorado River Substations (details in Table A4 of EIS Appendix 5, Attachment 2, p. 21). This level of online power generated is a representation of 3,853 MW of installed renewable resource capacity at these interconnection points accounting for the 36 percent capacity factor of the case. Although the SCE comment disagrees with the level of generation modeled, the comment does not contradict the EIS conclusion that the Phased Build Alternative satisfies the level of generation modeled with the Reliability Base Case in modeling Case #3 (EIS Appendix 5, Attachment 2, p. 10). The power flow analysis of Case #3 also includes the import of 1,400 MW from IID.

The comment claims that incorrect generation levels are used in the power flow modeling. All generation assumptions within the CAISO's Cluster 7, Phase I, 2019 base case and the 2024 Reliability Base Case were unchanged from what was available on the CAISO's website (as disclosed in the EIS Appendix 5, Attachment 2, p. 7), and these were the most up-to-date base cases available on the CAISO's secure website at the time that the Draft EIR/EIS was prepared. The scenarios were selected prior to the availability of Cluster 8 case data; however, while conditions have changed and will continue to change, the EIS accurately recognizes that the interconnection queue changes often

Responses to Comments F1-6, F1-7, and F1-8 address the performance of the Phased Build Alternative in the various power flow modeling cases.

F2-4 The comment states that a greater level of generation requires the Proposed Project than the levels tabulated by the power flow modeling report. The values that lead to 1,881 MW of generation, as a subset of those identified in the CAISO response to the data request, are shown in EIS Appendix 5, Attachment 2, p.6. See General Responses GR-1 and GR-2 regarding need.

F2-5 The comment states that the discussion of the interconnection queue that appears in the power flow modeling report does not apply to the Proposed Project. The system-wide data presented in EIS Appendix 5, Attachment 2, p.6 are not disputed by the comment, which focuses on projects occurring within specific corridors. The data in the EIS are illustrative of the potential for generation projects to withdraw, and no further clarifications are necessary.

F2-6 The comment asserts that the Phased Build Alternative would fail to fulfill the EIS Basic Project Objective 2. General Response GR-3 provides further information on the ability of the Phased Build Alternative to satisfy Basic Project Objective 2. General Response GR-3 also discusses the renewable energy portfolios as they relate to the Proposed Project and the alternative.

The comment also restates SCE's opinion that the Proposed Project should "maximize the corridor capacity." This contrasts with SCE's stated Project Objective to "maximize the use of the existing transmission line rights-of-way," which is interpreted as EIS Basic Project Objective 3 to maximize the availability of remaining space in the corridor. General Response GR-2 notes that the objectives listed by SCE in its PEA for the Proposed Project included no minimum generation level goals or a minimum targeted capability for the corridor.

F2-7 The comment asserts that the Phased Build Alternative would fail to meet the EIS Basic Project Objective 3. The EIS assesses the goal of maintaining adequate space within the corridor in the consideration of Basic Project Objective 3, and Basic Project Objective 3 is qualitative in nature. General Response GR-2 also provides a discussion of the agency-specific Basic Project Objectives.

The analysis in the EIS (Appendix 5, Section 4.4, p. Ap.5-54) shows that sufficient space would remain available for expansion, while recognizing that less space would be available under the alternative. Consideration of the programs, including Desert Renewable Energy Conservation Plan ("DRECP"), the BLM Solar Programmatic EIS (PEIS), and the CPUC's Long Term Procurement Planning process (LTPP), that drive the need to add future transmission in the corridor appears throughout the EIS, notably in the cumulative scenario (Section E.2.3.1, Background).

The comment clarifies SCE's proposal to "maximize the capacity" of the upgrades within the corridor. However, this goal is different from the second of SCE's six project objectives, which is to "maximize the use of existing transmission line rights-of-way to the extent practicable." The EIS reflects the goal that increasing the capacity of the WOD transmission lines directly improves the ability for numerous renewable generation projects to interconnect (EIS, Section A.2.3). Accordingly, and consistent with the Garamendi Principles, Basic Project Objective 3 reflects the aim to be prudent in the use of land within the existing transmission corridor and to allow adequate space within the ROW for future transmission expansion (Section A.2.3). Response to Comment F1-13 addresses SCE's argument to maximize the size of the project now in light of the opinion that at some future date, a need for additional transmission is likely to arise.

F2-8 The comment asserts that the Draft EIR/EIS dismisses SCE's stated objectives and that the Phased Build Alternative would not fulfill SCE's purpose and need. The comment shows 11 bullet points regarding purpose and 5 bullet points regarding purpose and need, that all expand on the concepts originally presented by SCE to support the purpose of the Proposed Project (EIS Section A.2.1.1, SCE's Project Purpose and Need). The EIS analysis reflects SCE's PEA, which defined six project objectives (EIS Section A.2.1). General Response GR-2 (Agency-defined Basic Project Objectives) clarifies how SCE's original objectives were retained as agency-defined Basic Project Objectives. See also General Response GR-1 on the level of project need

F2-9 The comment asserts that the Phased Build Alternative would trigger additional transmission system upgrades, including capacitor banks to provide reactive power support (in terms of MVAR). The comment identifies the implementation of a remedial action scheme (RAS) and additional reactive support features that would only be added to the corridor in response to excessive levels of generation, should the additional generation be developed.

Response to Comment F1-6 shows how these features were found to be needed in the ZGlobal analysis of Case #6, although the power flow modeling conclusion for Case #6 notes that the Phased Build Alternative is not technically feasible in this scenario (EIS Appendix 5, Attachment 2, p. 12). See also General Response GR-4 (Analysis of Potential Future Construction under the Phased Build Alternative).

F2-10 The comment reviews and lists the generation projects that have requested deliverability. The comment states that the Phased Build Alternative would limit the ability to provide deliverability. SCE also claims that the Proposed Project is a critical project and that the Phased Build Alternative would create an impediment in achieving RPS goals, including a higher 50 % RPS in Senate Bill 350 (2015). The comment restates the position that a high level of generation requires the Proposed Project. See General Responses GR-1 and GR-2 regarding need.

General Response GR-3 (Renewable Energy Accommodated by the Phased Build Alternative) provides further information on the ability of the Phased Build Alternative to satisfy Basic Project Objective 2, regarding facilitating renewable energy, and General Response GR-3 discusses the use of RPS portfolios from the transmission planning process in evaluating project-level need. General Response GR-3 also includes a discussion of achieving California's future renewable energy goals in light of Senate Bill 350 (2015).

See also Response to Comment F1-9 and Response to Comment B9-3.

F2-11 The comment describes higher power losses that are a function of conductor resistance and that would be greater with the Phased Build Alternative than with the Proposed Project. This topic is addressed in Responses to Comments B9-4 and B9-11.

F2-12 The comment identifies potential implementation of a remedial action scheme (RAS) and additional reactive support that may be needed with the Phased Build Alternative, and the comment characterizes these elements as adding operational complexity.

The potential need for these operational elements and the resulting level of operational complexity, are addressed in Response to Comment F1-6, which notes how these features were found to be needed in the ZGlobal analysis of Case #6, although the power flow modeling conclusion for Case #6 notes that the Phased Build Alternative is not technically feasible in this scenario (EIS Appendix 5, Attachment 2, p. 12).

F2-13 The comment indicates that the Phased Build Alternative would require an additional two years before SCE could put it into service, and that upstream development of generation projects could be delayed or postponed and some projects could fail. The EIS provides preliminary information regarding the scheduling of the alternative, for the limited purpose of assessing whether it would be eligible for consideration as an alternative to the Proposed Project. See also Response to Comment F1-20 for information on the potential for the alternative to result in a delay to SCE's anticipated in-service date.